

Charge  
Engineering Design Review  
Inner Triplet Interconnects  
29-30 January 2002, CERN

Background:

FNAL is responsible for the cryostats for the IR Interaction Region Quadrupole systems. The FNAL work scope includes:

- Design, development and fabrication of the cryostats.
- R&D on support structures.
- Assembly of U.S.- and Japanese-built quadrupoles (MQXB and MQXA respectively) together with CERN-supplied correction coils into the cryostats to produce complete LQX cryoassemblies for all four interaction regions.
- Design and fabrication of the intermediate beam absorbers.
- Design and fabrication of the interconnect components for the inner triplet quadrupoles, except those associated with the beam vacuum system.

Planned Design Reviews:

An Engineering Design Review (EDR) is to be conducted when most of the R&D is complete and the engineering design has been finalized. For a system to pass the EDR, it must be demonstrated that all of the technical and engineering challenges have been adequately addressed.

This EDR follows several cryostat design reviews: a Conceptual Design Review (CDR) that was held on 3 December 1998, an Interim Design Review that was held on 13 March 2000, an Engineering Design Review (EDR), and a Production Readiness Review (PRR) that is scheduled for 23 January 2002. The reports, including action items, have been issued for all but the PRR.

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Design Team:

The design is represented by:

- M. Lamm, FNAL
- T. Nicol, FNAL Cryostat Lead Engineer
- T. Page, FNAL
- R. Bossert, FNAL
- T. Peterson, FNAL
- Ian Collins, CERN
- J.-P. Tock, CERN
- Gerhard Schneider, CERN

Design Review Committee:

The design review committee members are as follows:

- Phil Pfund, FNAL, Chairman
- Jim Strait, FNAL
- Ranko Ostojic, CERN
- Rob van Weelden, CERN
- Blazej Skoczen, CERN
- R. Veness, CERN
- G. Steveson, CERN
- J.-P. Quesnel, CERN
- L. Vos, CERN

Scope of the Review:

The EDR will cover the following items in particular:

- Final designs of the interconnect regions: warm-to-cold transition to Q1, Q1 to Q2, Q2 to Q3 and Q3 to DFBX:
  - Cryogenic piping
  - Bus and instrumentation connections
  - Beam vacuum interconnect, beam screen, and warm-to-cold transition.
  - Intermediate absorbers (TAS2 and TAS3)
  - BPM installation and feedthroughs
  - Pumping ports
- Functional Specification and Interface Specification documents.
- Installation and alignment in the tunnel.
- Radiation safety issues.

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The review will not explicitly cover the design and testing of the MQX IR high gradient quadrupoles. The MQXB was covered by a separate EDR conducted on 16 March 2000 and PRR on 22 June 2001, and the MQXA is the responsibility of KEK.

The design review committee has the usual freedom to investigate other areas of the cryostat design that present a risk to the successful completion of the project, installation, and operation in the LHC.

Date of the Review Committee Meeting:

The review is scheduled for 29 January 2002 at CERN. It is anticipated to take one day. However, due to the complexity of the subject, provision has been made to allow the review to continue for an additional half day, if required.

Results of the Review:

The EDR review is expected to result in a clear statement by the Project Manager approving, disapproving, or limiting the completion of the design of the inner triplet interconnects. In the case of limited approval, the Project Manager will specify design hold points requiring additional approval or review along with the requirements for moving beyond those hold points. The review committee is expected to make their recommendations with this objective in mind.

The current forecast date for completion is 15 March 2002. The review will be complete with the issuing of a report summarizing the technical designs reviewed, committee recommendations, and action items.

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Schedule for the Review:

EDR Schedule – LQX Cryostat

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|----------------|---|
| 11 Jan 2002    | Contents of preview package selected by the FNAL project Manager and approved by the US LHC Project Manager.  |
| 16 Jan 2002    | Preview package and draft agenda posted on a FNAL web site. Reviewers will be notified of the URL and given a list of material posted. Reviewers will be given subsequent notification when additional documents are posted or existing documents modified.   |
| 23 Jan 2002    | Reviewers provide preliminary comments to the Chairman. The comments are intended to ensure that issues of specific interest to the reviewers will be adequately addressed during the review meeting. The comments are based on the material provided in the preview package and on each reviewer's previous knowledge of the project and technology. |
| 29-30 Jan 2002 | Design Review meeting conducted.  |
| 12 Feb 2002    | Draft report of the review sent to reviewers by the Chairman.   |
| 21 Feb 2002    | Reviewer return comments on the draft report to the Chairman.   |
| 15 Mar 2002    | Final report of review approved by the US LHC Project Manager and issued by the Chairman.   |